



Cleaning for Health & Efficiency

A REPORT

LEARN MORE ABOUT:

Cleaning for Health

Indoor Air Quality

Productivity

Ergonomics



The information presented in this report is designed to enable better understanding of the effects of sustainable cleaning and proper vacuuming on your facility.

BUILDING OWNER'S GUIDE

ProTeam® is committed to

Cleaning for Health®



ProTeam has partnered with the American Lung Association in a campaign designed to promote public awareness and education about indoor air quality issues.

This educational partnership recognizes the American Lung Association's mission of preventing lung disease and promoting lung health as well as ProTeam's goal of developing innovative cleaning technologies to address indoor air quality concerns.

The American Lung Association does not endorse products. For more information from the American Lung Association, call 1-800-LUNG-USA, or visit their website at www.lung.com.



Historically, the quality of vacuuming has been evaluated by the appearance of the carpet. However, the statistical data of expert studies in this report will demonstrate the importance of proper vacuuming to issues of indoor air quality, particulate removal and containment, and also present new concepts on labor efficiencies.

**ProTeam is committed to
manufacturing superior,
high-filtration vacuums
that triumph over the
challenges of
Cleaning for Health.**

Cleaning or Polluting?

By John Walker President, ManageMen, Inc. Founder, Janitor University

When we established the Janitor University Philosophy of Cleaning, one of the guiding principles was

“Clean for health first, then appearance.”

Of course, Cleaning for Health® requires the proper chemicals, equipment and machines, but more important is the system that is utilized within the cleaning operation. The system, or process, must assure that the facility is properly detail cleaned on a scheduled basis and it must assure that cleaning, rather than polluting, is the result of the cleaning worker activities in the facility.

IMPROVE CLEANING PRACTICES

Poor cleaning procedures, equipment and habits can inhibit the effective cleaning of buildings.

Workers thinking big need to

think small



skin flake magnified

when it comes to health and cleaning. Cleaning for appearance removes “big” visible soil rather than cleaning for health that removes “small” invisible bacteria, dust and airborne particulates and other micro, bio- and chemical contaminants – largely the contributors to unhealthy indoor environments.

ProTeam vacuums capture soil and safely contain harmful particles, as well as prevent them from being reintroduced back into the environment. The improved air quality is the result of ProTeam vacuums’ unique Four Level® Filtration system. This system captures tiny dust mites, bacteria, and other particles – which can cause unhealthy air.

FACTS

TO KNOW ABOUT INDOOR AIR QUALITY

CARPETS

Daily vacuuming is more important than interim deep cleaning methods.

Dry soil is abrasive; when ground into your carpet, it cuts into carpet fibers—dulling appearance and reducing the longevity.

- No. 1 Carpets cover 70% of the floors in the United States.
- No. 2 Carpet can hold more than its weight in soil.
- No. 3 70–80% of dust, dirt and grime is tracked into a building from outside.
- No. 4 30% of dirt is deposited in the first 3 feet, while 90% is tracked off in the first 25 feet.
- No. 5 Carpet soil generally consists of 85–95% dry soil and 5–15% oily soil.
- No. 6 Carpet has a high surface area and is known to act as an organic dust sink containing bio-contaminants and allergens.

HARD FLOORS

When using the correct tools, ProTeam backpack vacuums clean 52% faster than a dust mop in crowded classrooms and congested areas.

- No. 1 Using traditional dust mopping methods requires extensive time to train employees.
- No. 2 Vacuuming is a faster, healthier and more efficient way to clean hard floors.
- No. 3 Dust and dirt are immediately contained within the Four Level Filtration in ProTeam vacuums.
- No. 4 Dust mopping continually redistributes dirt and fine particulate on and into the floor, leaving scratches and dulling a high gloss finish.
- No. 5 Dust bunnies reappear in 24 hours when a floor has been dust mopped as compared to 72 hours when cleaned with a ProTeam backpack vacuum.

Sources—

Carpet and Rug Institute, Dalton GA; ISSA: International Sanitary Supply Association; IIREC: Institute of Inspection Cleaning and Restoration; Dust Mopping Floors for Health and Efficiency Test, Colorado State University, 1998; Photo: Courtesy of CRI

Protect the Built Environment

The average American spends approximately **90 percent** of his or her time indoors. Studies of human exposure to air pollutants by the EPA indicate that indoor levels of pollutants may be **2 to 5 times** – and occasionally more than **100 times** – higher than outdoor pollutant levels.

90%
time indoors

Children are more susceptible to air pollution because they breathe a greater volume of air relative to their body weight. To make matters worse, schools tend to be at a higher risk of poor indoor air quality because they can have **4 times** the occupants as a regular office building for the same amount of floor space and generally less maintenance, making air quality in schools an area of a particular concern.

4x
the occupants

A cleaning for health vacuuming strategy – with an efficiently filtered vacuum cleaner – can help schools reduce asthma triggers by removing (rather than redistributing) the dust in a building.



Environmental factors in schools can cause serious health problems for children.

Programs that promote healthy indoor air quality (IAQ) can:

- Improve Health
- Increase Students' Ability to Learn
- Improve Test Scores
- Improve Adult Productivity in the School System

Maintaining healthy physical conditions and good environmental quality in schools can yield a high rate of return on academic outcomes.

Sources—

<http://www.epa.gov/region1/communities/indoorair.html>

http://www.epa.gov/iaq/schools/student_performance/faqs.html

FIL•TRA•TION:

– Noun

1. the process of filtering
2. the act of process of removing something unwanted from a liquid, gas, etc., by using a filter



People can inhale particles 10 microns and smaller.



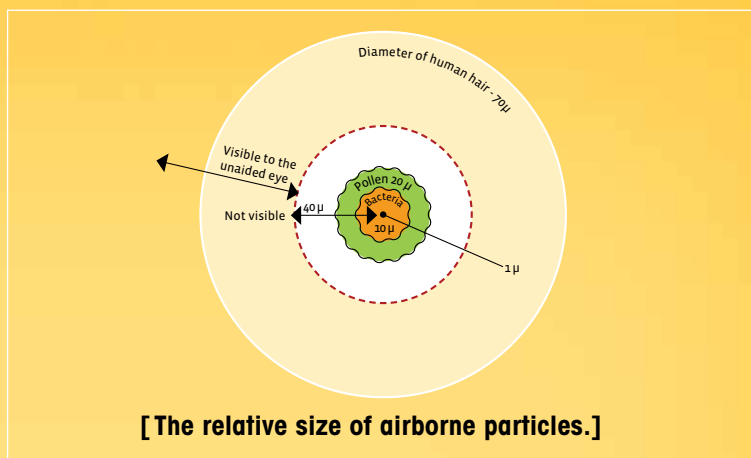
Housekeeping is probably the most common means of removing potential allergens, and vacuum cleaners are the most commonly used tool.



Vacuum cleaning removes some fungus and spores from carpeting, but it also reintroduces them to the air, either through the action of the vacuum's beater bar or through conventional bags.



Vacuuming without proper filtration is one of the main causes of the reintroduction of allergens and harmful particles into the air.



Micron (μ):

This measurement of particles (1 micron = 1 millionth of a meter) is often used in promoting particle removal. To put things in perspective, your hair is about 70 microns in diameter and, without magnification, you can only see particles that are about 10 microns or larger.

Vacuums with high filtration collection systems retrieve soil and safely contain harmful particles, preventing them from being reintroduced into the built environment.

Source—JW Vaughan, JA Woodfolk, TA Platts-mills. "Assessment of vacuum cleaners and vacuum cleaner bags recommended for allergic subjects". Journal of Allergy and Clinical Immunology. November 1999. 104(5):914-16. Ibid. Popplewell EJ, Innes VA, et al. Pediatr Allergy Immunol. 2000 Aug;11(3):142-8. "Indoor Allergens: Assessing and Controlling Adverse Health Effects", Educational Committee on the Health Effects of Indoor Allergens. Division of Health Promotion and Disease Prevention. National Academy Press, Washington, D.C. pp 37-39, 86-117, 222-225;

Backpack Vacuum Cleaning Efficiency vs. Sweeping



VS.



In soil removal tests conducted at Turi Surface Solutions Laboratory:

A ProTeam Backpack vacuum removed more than 98% of the soil – a 10% increase with vacuuming compared to sweeping.

Source—

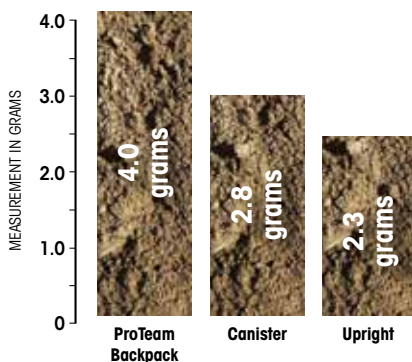
Toxics Use Reduction Institute (TURI), University of Massachusetts Lowell, November 2012.

VACUUM CLEANER EFFICIENCY

In 5 passes, the ProTeam backpack vacuum is:

43% more efficient than a commercial upright vacuum and

30% more efficient than a canister in removing soil.**



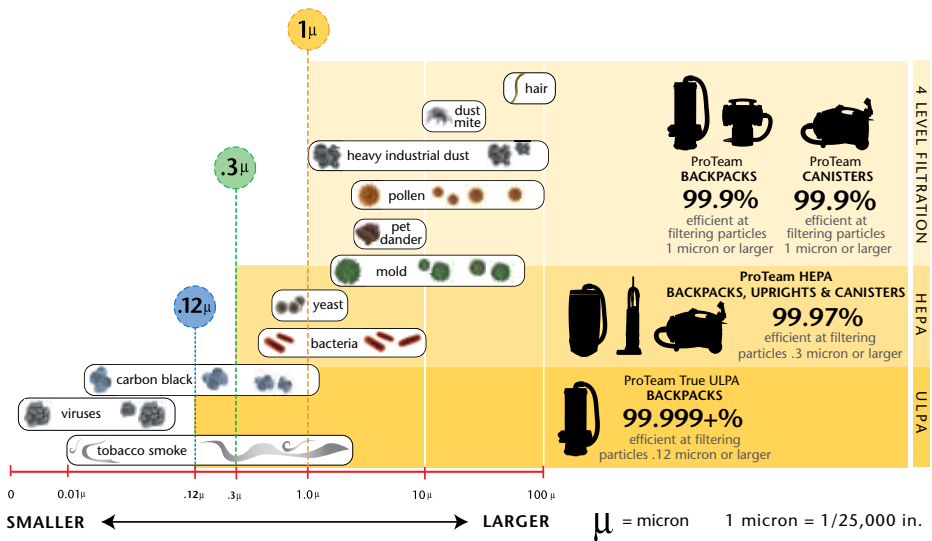
** Soil removed does not include carpet fiber

Source—

Quality Environmental Services & Technologies, 1996; APC Filtration, Inc., 1996; An Evaluation of ProTeam's QuarterVac and CoachVac in a School Environment, Dr. Eric Brown, Cleaning Research International, UK, 1994

PROTEAM'S FILTER EFFICIENCY CHART

This chart illustrates how effective ProTeam's different filtration systems are in **capturing and containing** particles of a particular size.



ProTeam backpacks & canisters with Four Level® Filtration are **99.9%** effective at capturing and containing particles measuring **1 μ** or larger.

technical definitions...

HEPA

A HEPA (High Efficient Particulate Air) filter is a throwaway, extended-medium, dry type filter in a rigid frame having a minimum particle collection efficiency of 99.97% (that is, a maximum particle penetration of 0.03%) for 0.3- μ particles.

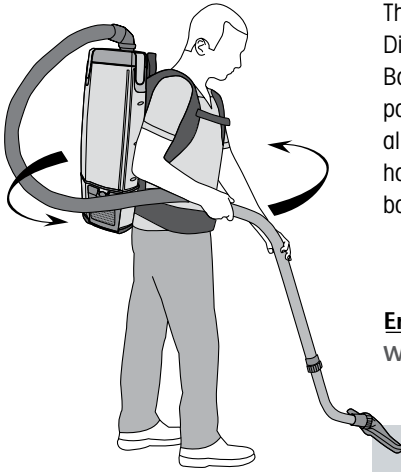
ULPA

An ULPA (Ultra-Low Penetration Air) filter is a throwaway, extended-medium, dry type filter in a rigid frame, having a minimum particle collection efficiency of 99.999% (that is a maximum particle penetration of 0.001%) for particles in the size range of 0.1 to 0.2 μ .

Source— Robert A. Woellner, President, Senior Scientist. Quality Environmental Services & Technologies Inc.

ERGONOMIC DESIGN

FAST AND EASY TO USE



The results of two studies by the Department of Surgery, Division of Orthopedics, at Ohio State University and the Battelle Memorial Institute, determined that ProTeam backpack vacuum cleaner's ease-of-use and ergonomic design allowed workers to vacuum more than twice the area in half the time with less fatigue and body strain (a figure backed by the ISSA official timetables for cleaning).

Ergonomic Motion

With a backpack – vacuum side-to-side, not front-to-back

Requires less than half the energy and effort to clean the same area as it would take with an upright

- Backpack vacuums are lightweight. When worn properly, the effect of the backpack on body joints and posture is negligible and similar to walking.
- When working near stairs, using a backpack improves mobility and is recommended to reduce the risk of falling.
- Backpack vacuum users use a more neutral posture compared to extreme arm and leg extensions seen when using an upright.
- Experience less body stress due to the use of larger muscle groups by minimizing "hunching over" often associated with upright and canister vacuums.
- Increases efficiency by allowing more carpet to be cleaned in a shorter amount of time due to the natural walking motion used.

Arms Getting Tired?

The arms are the main muscles used when vacuuming front-to-back.

Side-to-Side Vacuuming

uses leg and back muscles that do not fatigue as easily as the arms.



"Side-to-side vacuuming, along with a typical work-rest schedule, is one of the best ways to vacuum large areas on a regular basis."

Jim Fullmer, Certified Human Factors Professional

FREEDOM OF MOVEMENT

Improves Comfort and Productivity

LESS FATIGUE

redesigned FlexFit™ harness
makes vacuum feel lighter
and more comfortable

STAY COOLER

open weave FlexFit harness
avoids collecting (or trapping)
heat during operation

FREEDOM OF MOVEMENT

articulating FlexFit harness is
responsive to the motion of the user's
shoulders, back and hips—increasing
comfort and reducing fatigue



WEIGHT DISTRIBUTION

innovative FlexFit harness distributes weight evenly for lighter feel

20% less pressure is felt on the
body with the FlexFit articulating
harness vs. a standard harness.

Source— Auburn University, 2013. FlexiForce Sensor

IMPROVED BALANCE

pivoting ball joint distributes the
weight to the natural center of gravity



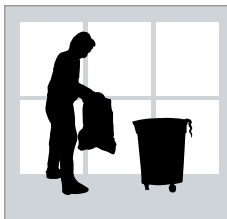
The Team Cleaning Solution

Team Cleaning® is a flexible, efficient and cost-effective cleaning system for custodial operations. Team Cleaning applies the power of systems to reduce costs and maximize productivity.

It offers solutions to the many challenges that managers face—through better deployment of labor, effective cleaning methods, improved appearance levels and simplified training programs.

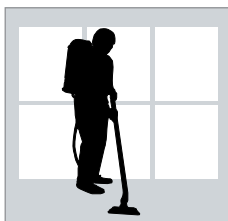
TEAM CLEANING TASKS ARE GROUPED INTO 4 DISTINCT FUNCTIONS

ProTeam Education Products and Services
Products and Services offered:



Light-Duty Specialist™

Dusting, emptying trash, spot cleaning, etc.



Vacuum Specialist™

Vacuumping carpets and hard floors



Restroom Specialist™

Cleaning, sanitizing and restocking restrooms



Utility Specialist™

Cleaning lobbies, spot cleaning, glass, mopping and scrubbing floors, etc.

**Team Cleaning results in increased productivity,
less equipment, clear-cut responsibilities
and easier supervision.**

Team Cleaning allows flexibility in staffing levels and with the size and complexity of the facility to which it is applied. The number of workers does not affect the Team Cleaning concept. In smaller buildings a worker may perform two or more specialists' duties.

CARPET AND RUG INSTITUTE APPROVED

ProTeam vacuums have earned Seal of Approval/Green Label from the Carpet and Rug Institute (CRI) signifying the vacuum systems meet higher standards for carpet cleaning effectiveness and indoor air quality. Vacuums must pass three cleaning requirements: soil removal, dust containment and carpet fiber protection.



PROTEAM IS A MEMBER

ISSA • BSCAI • NRA • ARSCI • AHE • APPA
NWFA • CIRI • IHRSA • ALFA • CFCN
VDTA • CRI • CSSA • USGBC • NPMA

PARTNERSHIPS



ProTeam has partnered with the American Lung Association in a campaign designed to promote public awareness and education about indoor air quality issues. This educational partnership recognizes the American Lung Association's mission of preventing lung disease and promoting lung health. The American Lung Association does not endorse products. For more information call 1-800-LUNG-USA, or visit www.lung.com.

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Vacuuming and Cleaner Indoor Air for Schools



The American Lung Association
does not endorse products.

Asthma in Schools Today

Schools all across the United States share not only an educational mission, but the reality of asthma.



In a classroom of 30 children, two are likely to have asthma¹, which is the leading chronic disease cause of school absenteeism.²

Asthma presents a host of issues to entire school populations.

It can impact each classroom, students' ability to learn, visits to nurses' offices, teacher productivity, absenteeism, and many others. Schools, however, can help ease asthma's impact by creating an "asthma-friendly" environment, including good indoor air quality (IAQ).

Asthma can be life-threatening if it is not properly managed.

The lungs of people with asthma are excessively sensitive to various "triggers" that cause asthma attacks, which result in narrowed airways and other changes, causing difficulty breathing. Asthma never goes away, but it can be controlled. When students' asthma is controlled, it won't interfere with normal daily activities, and asthma attacks are minimized. Everyone with asthma—including those with mild asthma—should avoid their known triggers.

At school, students may be exposed to several triggers on a daily basis. Individuals' triggers can include seasonal and pet allergens, outdoor air pollution, viruses, and indoor air irritants like microscopic particles found in dust, dirt, dust mites, and cockroach antigens. Some triggers like cat dander and other allergens enter the school environment on students and staff who have pets at home.³

“Asthma Friendly” School Environments

Avoiding triggers can make a great difference
in a child’s day-to-day asthma control.

Schools nationwide are becoming more involved in proactively creating asthma-friendly environments to best support students with asthma and minimize asthma’s affect on a school’s daily rhythms.

Asthma-friendly activities present a holistic approach throughout many elements of school infrastructure and curriculum, including creating a healthy environment.



The National Asthma Education and Prevention Program’s *How Asthma-Friendly Is Your School?* assessment includes two environmental questions:

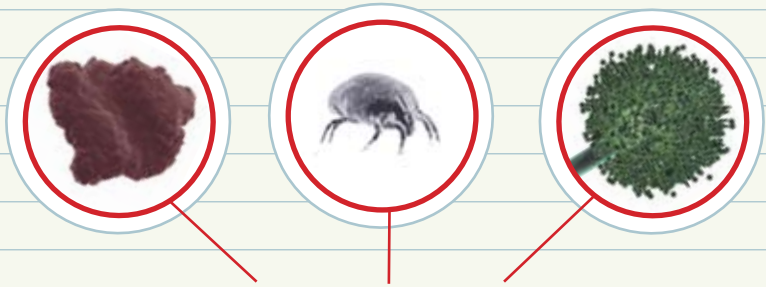
1. Does the school maintain good indoor air quality?
2. Does it reduce or eliminate allergens and irritants that can make asthma worse?⁴



The American Lung Association's
Asthma-Friendly Schools Initiative
*provides a wide-range of tested advice for
schools to help create "Asthma Friendly Schools."*

To improve air quality in the school itself, the American Lung Association recommends all schools use the **Indoor Air Quality Tools for Schools Kit** developed by the U.S. Environmental Protection Agency with the help of the American Lung Association.

The easy-to-use checklists in the Tools for Schools Kit not only help reduce asthma triggers, but improve air quality for all teachers and students alike.

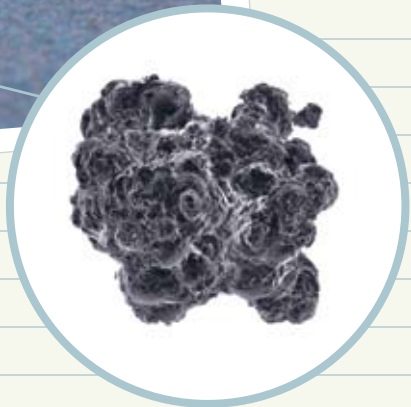


Reducing or eliminating students' exposure to triggers like
**pet dander, dust mites, and
microscopic dust particles**

is not a simple piece of the environmental puzzle. The most effective way is to keep as many of those sources of pollution outside of the school. Once those allergens and irritants are inside, however, students can benefit from a comprehensive cleaning protocol that incorporates the most effective means of removing them from the environment.

Keeping Asthma Triggers Down:

One simple way to help keep dirt and other particles out of the classroom is to have large entry mats at all entrances that can let children track off much of the soil before they get far into the school.



Finding & Attacking Asthma Triggers: “Clean Vacuuming”

Many allergens and irritants eventually will settle on hard surfaces and carpeting throughout the school. Carpet is a well-known “sink” for dirt, animal dander, pollen, dust mites, and other asthma triggers. These same triggers also can be found on hard flooring, which now comprises about 69 percent of space in new K-12 facilities.⁵



A “clean vacuuming” strategy

can help schools reduce asthma triggers by removing (rather than redistributing) the dust in a building by vacuuming surfaces with an efficiently filtered vacuum cleaner.



Effective vacuuming is not simple—unless the building’s staff understand the basics.

Keep these basics in mind:

1. Asthma triggers often come in tiny particles like pollen and pet dander. Many of these particles cannot be seen without a microscope, so **staff cannot use visible dust alone as evidence of whether or not the vacuuming program is effectively capturing asthma triggers.** Some particles settle in carpet and on hard surfaces. The goal is to remove particles from carpet & other surfaces without putting them back into the air.
2. Any movement across flooring—including the movement of a vacuum cleaner—kicks tiny particles into the air. Some of the smallest particles, like cat dander, can spread through a room easily. Be aware that some vacuum cleaners spread these asthma triggers, rather than removing them, because they cannot trap particles.
3. Vacuum carpets frequently and thoroughly to help limit the allergens and dirt particles indoors. Always vacuum after all students have left the building. Vacuum or damp mop hard surface floors. Don’t dry-mop them, as that spreads dust throughout the air.

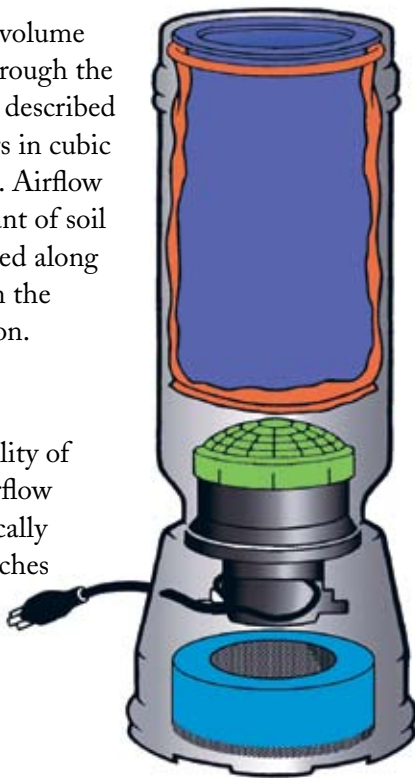
High filtration vacuum systems can be effective and can reduce allergens and other triggers. Understanding the elements that can translate into “clean vacuuming” is critical to improving a building’s indoor air and creating an asthma-friendly school environment. Choose and use a vacuum system that effectively captures fine particles, including a range of asthma triggers, and minimizes particles being reintroduced into the air.

Vacuum Cleaner ABC's

A vacuum cleaner is
a system of **four** interrelated components
that should result in high “particles in-particles out”
(particles in: removes the most particles from the surface,
particles out: releases the fewest particles back into the
indoor environment) efficiency.

1. **Airflow:** volume of air moving through the vacuum (usually described by manufacturers in cubic feet per minute). Airflow affects the amount of soil that can be carried along and contained in the vacuum's filtration.

2. **Lift:** the ability of the vacuum's airflow to lift dirt (typically measured in “inches of lift”).



3. **Filtration:** capturing of soils, mainly responsible for reducing “particles out.” Filtration must be designed to work with airflow and lift so that the particles are stopped, but not the airflow.

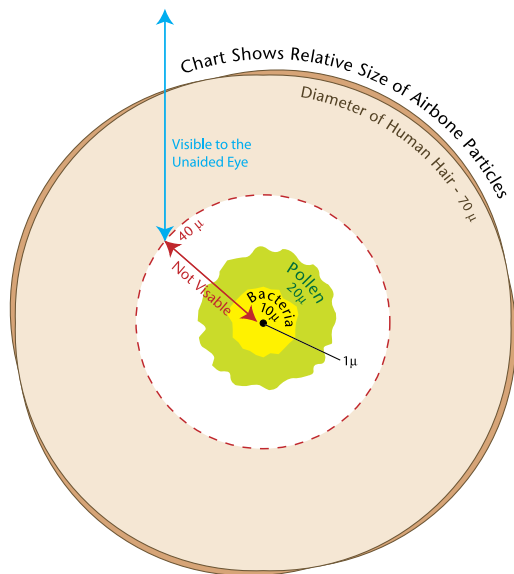
4. **Design:** mechanical elements that can reduce airflow or allow dust to pass by a filter without being caught (for example, gaps in the vacuum body that allow dust to leak out).

To achieve clean vacuuming, a vacuum needs excellent filtration with a properly sized and sealed filter system that uses the appropriate filter media.

Filtration ABC's

A note about filtration systems: Filtration systems involve bags and filters, and commercial vacuum manufacturers typically describe efficiency in percentage of particles removed. Testing and reporting, however, are not standardized, so manufacturers' claims can be tough to compare. Some elements to keep in mind:

Microns: This measurement of particles (1 micron = 1 millionth of a meter) is often used in promoting particle removal. To put things in perspective, your hair is about 70 microns in diameter and, without magnification, you can only see particles that are about 10 microns or larger.



Bags: The amount of dust that can escape varies greatly, even among micro filter bags, but some micro filter bags capture nearly 2400 percent more dust than single-ply bags. Micro filter bags have greater media density that allows them to capture far more fine dust.⁶

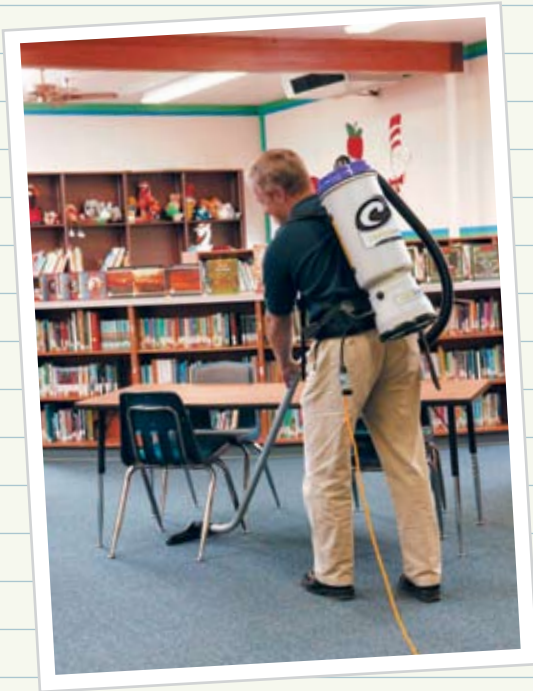
Filters: Layered micro filters have been shown to greatly increase vacuum efficiency.⁷ “Electrostatic” micro filters use positively-and negatively-charged fibers that capture charged particles in the air passing through the filter. High efficiency particle air (HEPA) filter media have also been shown to be effective at removing allergens and particles indoors.⁸

What Schools Can Do?

A clean vacuuming strategy will help schools minimize or eliminate students exposure to allergens and irritants that are known asthma triggers.



Vacuuming carpets as well as hard floor surfaces frequently and thoroughly with an efficient vacuum system can remove allergens and fine particles from the school environment.



Selecting a vacuum system for clean vacuuming can be complicated.

Comparing various manufacturers' test results, which are not standardized across the vacuum cleaner industry, is like comparing apples to oranges.

Take the time to understand which elements will help you vacuum more cleanly and improve air quality for all students and staff.

When selecting a system:

- Research vacuum systems as much as possible to assess which offer the best quality in terms of airflow and filtration, as well as design best suited to maintenance staff.
- Ask manufacturers questions and request documentation for any health and performance claims.
- Request independent test data regarding filtration, airflow and efficiency. Specifically ask for data to determine the quantity and size of dust particles captured.
- Check references to validate claims.
- Select a unit with high-efficiency filters such as micro filter or HEPA media, good suction, and sealed construction.⁹

The majority of schools include carpeting, and, unfortunately, it would be very difficult to identify a school lacking students with asthma. Schools can take steps to initiate and sustain a “clean vacuuming” system to remove allergens and other asthma triggers from carpet—without redistributing those particles back into the environment.

Sources

¹ LJ Akinbami, KD Schoendorf. Trends in childhood asthma: prevalence, healthcare utilization, and mortality. *Pediatrics*, 2002; 110(2):315-322

² CDC. Asthma prevalence, health care use and mortality, 2002. Hyattsville, Maryland: US Department of Health and Human Services, CDC, National Center for Health Statistics, 2004. (accessed at <http://www.cdc.gov/HealthyYouth/asthma/index.htm> on May 15, 2006)

³ C. Almqvist, M. Wickman et al., Worsening of asthma in children allergic to cats, after indirect exposure to cat at school. *American Journal of Respiratory and Critical Care Medicine*: 163 (3), March 2001, 694-698.

⁴ How Asthma-Friendly Is Your School?. Centers for Disease Control & Prevention, National Asthma Education and Prevention Program. <http://www.nhlbi.nih.gov/health/public/lung/asthma/friendly.htm> (accessed May 15, 2006)

⁵ American School & University's 31st Annual Official Education Construction Report, May 2005.

⁶ JW Vaughan, JA Woodfolk, TA Platts-mills. Assessment of vacuum cleaners and vacuum cleaner bags recommended for allergic subjects. *Journal of Allergy and Clinical Immunology*. November 1999. 104(5):914-16.

⁷ Ibid.

⁸ Popplewell EJ, Innes VA, et al. *Pediatr Allergy Immunol*. 2000 Aug;11(3):142-8.

⁹ Ibid.

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For more information about ProTeam's complete line of commercial vacuums, call 866.888.2168 or visit www.pro-team.com



The American Lung Association does not endorse products. ProTeam makes a contribution to the American Lung Association to participate in this educational opportunity.

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